Marginal Treatment Effects

Applied Microeconomics

Hans-Martin von Gaudecker & Florian Zimmermann

Setup

- Roy model with

$$S = \mathbb{I}\big[P\left[S = 1 \big| Z = 1\right] \leq U\big]$$

- Marginal treatment responses:

$$E[Y(S = 0, \omega)|U = u] = m_0(u)$$
$$E[Y(S = 1, \omega)|U = u] = m_1(u)$$

- Take difference to get MTE

Marginal Treatment Effects

$$\begin{aligned} MTE(u) &= m_1(u) - m_0(u) \\ &= E[Y(S=1,\omega) - Y(S=0,\omega) | U = u] \end{aligned}$$

- Empirically useful directly with continuous instrument:

$$MTE(u) = \frac{\partial}{\partial p} E[Y(\omega)|P=p]\big|_{p=u}$$

  MTE is point-identified at observed values of $p(Z)$

- Always useful as a building block

TEs as a functions of MTEs

$$X = \int_0^1 MTE(u) w_x(u) du$$

- ATE: $w_{ATE}(u) = 1$
- ATT: $w_{ATT}(u) = \frac{P[[S=1|Z=1] \geq u]}{P[S=1]}$
- ATUT: $w_{ATUT}(u) = \frac{P[[S=1|Z=1]] < u}{P[S=0]}$
- PRTE a bit too involved for this slide, but perfectly doable
- Table 1 in Mogstad, Santos, Torgovitsky ("Using Instrumental Variables For Inference About Policy Relevant Treatment Parameters") has it and many more (in terms of MTRs)